

# CONSTRUCTION AND CALIBRATION OF A DIFFERENCE FREQUENCY LASER SPECTROMETER AND NEW THZ FREQUENCY MEASUREMENTS OF WATER AND AMMONIA

J. C. PEARSON, HERBERT M. PICKETT

Jet Propulsion Laboratory, California Institute of Technology, 4800 Oak Grove Dr., Pasadena, CA 91109

PIN CHEN

National Institute of Standards and Technology, Time and Frequency Division, 325 Broadway, Boulder, CO 80303

SHUJI MATSUURA, GEOFFRY A. BLAKE

Division of Geological and Planetary Sciences, California Institute of Technology, Pasadena, CA 91109

A three laser system based on 852nm DBR lasers has been constructed and used to generate radiation in the 750 GHz to 1600 GHz frequency region. The system works by locking two of the three lasers to modes of an ultra low expansion Fabry-Perot cavity. The third laser is offset locked to one of the cavity locked lasers with conventional microwave techniques. The signal from the offset laser and the other cavity locked laser are injected into a Master Oscillator Power Amplifier (MOPA), amplified and focused on a low temperature grown GaAs photomixer, which radiates the difference frequency. The system has been calibrated with molecular lines to better than one part in  $10^7$  (1). In this paper we present the application of this system to the  $\nu_2$  inversion band of Ammonia and the ground and  $\nu_2$  states of water. A discussion of the system design, the calibration and the new spectral measurements will be presented.

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(1) Shuji Matsuura, Pin Chen, Geoffrey A. Blake, J. C. Pearson and Herbert M. Pickett, IEEE MTT, in press (1999)